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[54] **PROGRAM CONTROLLED CAPACITIVE KEYBOARD VARIABLE THRESHOLD SENSING SYSTEM**

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[52] **U.S. Cl.** ..... **364/900;** 340/365 C

[58] **Field of Search** ... 364/200 MS File, 900 MS File; 235/451; 340/365 R, 365 C, 365 E, 365 L, 365 P, 365 A; 324/60 C, 60 CD, 98, 99 R, 57 R

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[57] **ABSTRACT**

A sensing apparatus for detecting impedance changes in a variable impedance matrix keyboard. A microcomputer is utilized to control the basic key intersection scanning and for accurately calibrating and adjusting the sensing threshold of the sense amplifier prior to testing each key intersection so that the effects of stray impedance and varying voltage levels may be compensated for. The micro computer supplies sense amplifier sensitivity threshold selection address codes to set the sensing level for the amplifier. Trial drive pulses are applied to a reference capacitor and are gated to the sense amplifier while the sensing level thereof is varied until no output is obtained. This effectively adjusts the sensing circuits for variable voltage power fluctuations occurring over a short time and compensates for variable capacitive effects not associated with actual key switch movements. The micro computer also has a memory containing known stray capacitance values associated with a given keyboard design and these values are also used to compensate by modifying the sensing threshold above or below the calibrated sensing level achieved. Thisis done after driving and measuring the capacitance response until a zero output is obtained so that the sensing level may be individually set for each given key in the matrix at that precise level which can provide the highest non-saturating sensitivity level for the amount of stray capacitance known to be associated with the key and for the existing power and capacitance conditions as originally determined by checking the reference capacitor.

6 Claims, 3 Drawing Figures